

WHAT IS CLAIMED IS:

2           1.    A system for location of a patient's body with  
3    spatial points on a treatment or diagnostic apparatus in  
4    registration with image data from an image scanner, the image  
5    scanner having a scanner coordinate frame and providing the  
6    image data of at least a portion of said patient's body  
7    scanned by said image scanner to said computer system to  
8    develop scanner marker coordinates in the scanner coordinate  
9    frame of scanner index markers located on said at least a  
10   portion of said patient's body, and to develop scanner target  
11   coordinates in said scanner coordinate frame of at least one  
12   target in said at least a portion of said patient's body, said  
13   system comprising:

14               a computer system to process camera data and the  
15   image data from the image scanner;

16               a camera system comprising two or more cameras, each  
17   having a field of view that comprises at least a portion  
18   of the patient's body on the treatment or diagnostic  
19   apparatus, said camera system indexing positions of the  
20   spatial points within the field of view, having at least  
21   one reference point in a known position with respect to  
22   said treatment or diagnostic apparatus with reference  
23   coordinates that are known in said camera system, the  
24   camera system providing camera data to the computer  
25   system to develop optical marker coordinates in the  
26   camera coordinate frame of optical index markers  
27   detectable by said camera system in the field-of-view and  
28   located in the same position on said patient's body as

29        said scanner index markers, and whereby said positions of  
30        said optical index markers are known with respect to said  
31        at least one reference point;

32        transformation means associated with said computer  
33        system to transform said scanner marker coordinates to  
34        said optical marker coordinates, and whereby said scanner  
35        target coordinates are transformed to camera target  
36        coordinates so that the position of said at least one  
37        target position is determined with respect to said at  
38        least one reference point of said treatment or diagnostic  
39        apparatus.

1        2.    The system of Claim 1 wherein said image scanner is  
2        a CT scanner and said scanner index markers are radiopaque  
3        markers that are adapted to be attached to said at least a  
4        portion of said patient's body and that have positions that  
5        are detectable in said image data.

1        3.    The system of Claim 1 wherein said optical index  
2        markers are light-emitting objects that are adapted to be  
3        attached to said at least a portion of said patient's body,  
4        and emit light detectable by said camera system to produce  
5        detectable camera data representative of said camera marker  
6        coordinates.

1        4.    The system of Claim 1 wherein said optical index  
2        markers are objects with geometric patterns that are  
3        detectable by said camera system to provide camera marker

1 coordinates.

2 5. The system of Claim 1 wherein said optical index  
3 markers are light reflecting objects that are adapted to be  
4 attached to said at least a portion of said patient's body and  
5 reflect light from light sources located near said camera  
6 system to produce detectable camera data representative of  
7 said camera marker coordinates.

1 6. The system of Claim 1 wherein said treatment or  
2 diagnostic apparatus is a LINAC and said reference point is a  
3 radiation isocenter of radiation beams from said LINAC.

1 7. The system of Claim 1 wherein said treatment or  
2 diagnostic apparatus is a diagnostic image scanning apparatus  
3 and wherein said reference point is a determinable point  
4 within the image acquisition range of the diagnostic image  
5 scanning apparatus.